

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-032482

(43)Date of publication of application : 03.02.1995

(51)Int.Cl.

B29C 65/02

B29C 47/06

B32B 15/08

// B29L 9:00

(21)Application number : 05-178280

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(22)Date of filing : 19.07.1993

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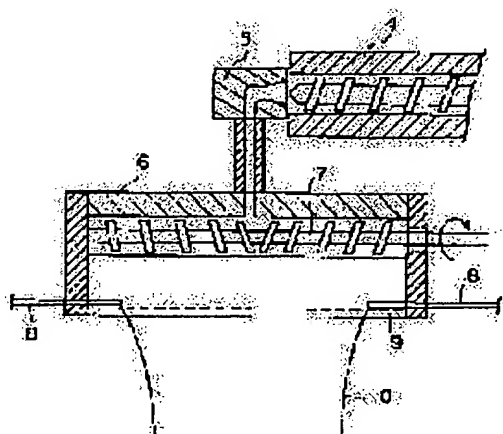
## (54) MANUFACTURE OF LAMINATED FILM

(57)Abstract:

PURPOSE: To reduce recessed and projected condition even when a laminated film is reeled under rolled condition by a method wherein molten thermoplastic resin is extruded out of a die under the condition of a molten film through a rotary screw arranged in the resin flow passage of the die.

CONSTITUTION: A laminated film is produced by a method wherein thermoplastic resin for laminate is molten and kneaded employing an extruder 4, then, the kneaded resin is extruded out of a die lip 9 through the resin passage of the die 6 attached to the extruder 4 under the condition of a film 10. A screw 7 is provided in the resin passage of the die 6 while the molten resin is moved by the rotation of the screw 7. The configuration of the groove of the screw is preferable that grooves are cut in left-and-right reverse directions from the center of the inlet port of molten resin when the inlet port is at the center of the lengthwise direction of the die. When the inlet port of

the molten resin is located at one side in the lengthwise direction of the die, it is preferable that the groove is cut in one direction.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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## MEANS

[Means for Solving the Problem] The manufacture method of the laminated film characterized by this invention extruding the fused thermoplastics in the shape of a melting film from a die through the rotation screw arranged in the resin circulation way of a die in the method of extruding in the shape of a melting film from a die, laminating [ a base material and ], sticking thermoplastics by pressure between nip rolls, and manufacturing a laminated film is offered.

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## OPERATION

[Function] The melting resin for a lamination is kneaded by the rotation screw prepared in the resin path in a die, and in the thick distribution of the cross direction of the melting film extruded from the die, since the position used as heavy-gage and thin meat always moves, on the roll of the rolled-round laminated film, irregularity is not conspicuous.

[0012] (Concrete explanation of invention)

the thermoplastics laminated in order to give heat-sealing nature, dampproofing, etc. to the thermoplastics base material for a lamination -- carrying out -- 0.880 - 0.970 g/cm<sup>3</sup> and MFR 1-150g / 10 minutes, [ density ] Preferably The ethylene system resin, for example, the ethylene homopolymer, for 4-50g / 10 minutes, Ethylene is made into a principal component. The copolymer of this and the alpha olefin of a propylene, butene-1, a hexene -1, and octene-1 grade, Ethylene is made into a principal component.; density a copolymer with this, vinyl acetate, an acrylic acid (meta), acrylic-acid (meta) alkyl ester, etc. 0.900 - 0.918 g/cm<sup>3</sup>, MFR Propylene system resin;, for example, the propylene homopolymer, for 4-150g / 10 minutes, A propylene is made into a principal component. The copolymer; polybutene of this and the

alpha olefin of ethylene, butene-1, and 4-methyl pentene-1 grade, Poly 4-methyl-pentene -1; it is thermoplastics, such as polyester resin, for example, a polyethylene terephthalate, polybutylene-terephthalate; polyamide resin, a polyvinyl chloride resin, a polyvinylidene chloride resin, and polystyrene resin.

[0013] the inside of these -- a low density polyethylene and a line -- propylene system copolymers, such as ethylene system resin; propylene ethylene copolymers, such as a metal salt (Zn, Na, K, aluminum) of a low density polyethylene, an ethylene vinylacetate copolymer, an ethylene methyl-methacrylate copolymer, an ethylene methyl-acrylate copolymer, an ethylene ethyl-acrylate copolymer, and an ethylene methacrylic-acid copolymer, an ethylene methacrylic-acid copolymer, and an ethylene acrylic-acid copolymer, and a propylene ethylene butene-1 copolymer, are desirable from low-temperature heat-sealing nature and a waterproof field

[0014] Although the thickness of a lamination film changes with uses, its 6-40 micrometers are preferably general 6-80 micrometers. Moreover, you may co-extrude a lamination film by laminated structures, such as an ethylene system resin / propylene system homopolymer, an ethylene system resin / polyethylene terephthalate, a propylene system copolymer / propylene homopolymer, and an ethylene system resin / polyamide / ethylene system resin, in order to give gas barrier nature, and a feeling of a high gloss and heat-sealing nature. In the thermoplastics for a lamination, the purpose of this invention can be added for various kinds of additives, for example, a slipping agent, an antistatic agent, an anti blocking agent, an ultraviolet-rays inhibitor, a heat deterioration inhibitor, a pigment, a color, perfume, minerals material, rubber, an elastomer, etc. at a not suitable grade.

[0015] as a base-material base material -- the polyamide of pulp paper; aluminum foil; textile fabrics, such as kraft paper and an art paper, nonwoven fabric; cellophane; nylon 6 and nylon 6, and 6 grades, polypropylene, and a line -- thermoplastics films, such as a low density polyethylene, a high density polyethylene, a styrene acrylonitrile copolymer, a polyethylene terephthalate, a polybutylene terephthalate, and a polycarbonate, these oriented films, or these laminated materials can be used Although the thickness of a base material also changes with uses, 20-300 micrometers is preferably general 10-1000 micrometers.

[0016] The equipment shown in drawing 3 and drawing 4 is used for the manufacture laminated film of a laminated film. Carry out melting kneading of the thermoplastics for a lamination using an extruder 4, and it passes through the resin path (manifold) of a die 6 in which this was attached by the extruder 4 by the adapter 5. It extrudes in the shape of film 10 from a die lip 9, and a laminated film 14 is manufactured by carrying out a sticking-by-pressure laminating to the front face of the base material 13 which was able to lead this melting film 10 by the cooling roll (cooling roller) 11 and the pressure roll (sticking-by-pressure roll) 12.

[0017] The heater is formed in the outside or the interior, and, as for the die 6, the temperature of each portion of a die is controlled by \*\*\*\*\*. The heater is usually divided into two or more zones, and each can carry out a \*\* tone uniquely. The screw 7 which can be rotated is formed in the resin path of this die 6, and when this rotates (5 - 300rpm), a melting resin moves. It is desirable that carry out the entrance of a melting resin in the center, and the slot is cut by the right-and-left opposite direction when there is an entrance of the melting resin of a die in the center of the length direction of a die, and when the entrance of a melting resin is in one side of the length direction of a die, as for the configuration of the slot of this screw, it is desirable that the slot is cut by \*\* on the other hand. The shaft of this screw pierces through the outer wall of a die, and this screw rotates it by the motor which has been extended besides the die and has been arranged besides a die, the gear, etc.

[0018] Near the die lip 9, it has Dekker 8 and 8 who adjusts film width, and the film width which carries out melting extrusion is decided by moving this Dekker approximately. As the lamination method, a melting film is laminated in the method and base material which carry

out the laminating of the melting film to one side of a base material, or both sides, a melting film is led between the method and base material which carry out the multilayer laminating of other films serially on this film further, and other films, and the method of carrying out the sandwiches lamination of this etc. is mentioned.

[0019] As occasion demands, have also been anchor-coat-agent-processed [ corona discharge processing ozonization, plasma treatment, and ] by a base material, a melting film, and other films. Especially, in case the extrusion temperature of a melting film is 220-300 degrees C, the extrusion lamination method of ozonizing a melting film has little adhesion of the degradation resin to the screw in a die, the die-lip section, etc., a gelling resin, a carbonization resin, etc., stay, etc., and it is a method desirable to prolonged operation. furthermore, the extrusion lamination method of ozonizing melting extrusion and a film for the polyethylene which added slipping agents, such as an alkylamide system usually used for a polyolefine system resin, 0.05 to 0.5% of the weight, or polypropylene at 220-300 degrees C can delete the spraying application of the lubricant of the shape of powder besides the effect of the above-mentioned ozonization extrusion lamination method, or since it can lessen a spraying coverage, it is a method desirable to manufacture which is the laminated film which was [ nature / slide / gloss, ] excellent Although the thickness of a laminated film also changes with uses, 18-1100-micrometer 20-400 micrometers are usual preferably.

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## EXAMPLE

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### [Example]

Extrusion (for rotation of the screw in a die, the width of 10rpm and a melting film is 600mm) of the low density polyethylene [MFR6g / 10 minutes (190 degrees C), and density 0.918 g/cm<sup>3</sup>] was carried out to the shape of a melting film from T-die at the resin temperature of 320 degrees C with the extrusion equipment which connected to the extruder with example -1 aperture [ phi ] of 90mm T-die equipped with the screw rotated in a manifold with an aperture of On the other hand, it is begun to roll biaxial-stretching polyester film with a thickness [ of 12 micrometers ], and a width of 500mm, and is an isocyanate system anchor-coat agent (Nippon Soda Co., Ltd. CHITABONDO T-120 and curing agent) to a front face 2g/m<sup>2</sup> The amount coat was carried out. Next, it was stuck by pressure by the nip roll so that the aforementioned low-density-polyethylene melting film might contact the coat side of this polyester film, and it cooled simultaneously, and considered as the laminated film (it considered as a part for 80m/in the average thickness of 30 micrometers of a low density polyethylene, and lamination speed). Subsequently, from the biaxial-stretching polyester film width of this laminated film, the low-density-polyethylene film overflowing into ends was cut off every 30mm, respectively, this laminated film was rolled round a length of 1000m, and it considered as the shape of a roll. There was no concavo-convex state in the appearance (visual observation) of this roll, it is good and gloss was [ the laminated film was also smooth and ] also good.

[0021] It sets in the example -2 example -1, and they are low-density-polyethylene [MFR 6g /, and 10 minutes (190 degrees C). It is low-density-polyethylene [MFR instead of density 0.918 g/cm<sup>3</sup>]. 14g / 10 minutes (190 degrees C), The resin temperature of 320 degrees C is changed into 280 degrees C using density 0.918 g/cm<sup>3</sup>]. Furthermore, before polyester film and a melting film-like low density polyethylene are stuck by pressure by the nip roll It is amount of ozone 12 g/cm<sup>3</sup> to a melting film-like low density polyethylene. It changed so that air might be sprayed and ozonized in the amount at the time of 1.5m<sup>3</sup>/, and also the laminated film was obtained like the example -1. There was no concavo-convex state in the appearance (visual observation) of this roll, it is good and gloss was [ the laminated film was also smooth and ]

also good.

[0022] In example -3 example -2, the low density polyethylene which added octadecanamide 0.10% of the weight as a low density polyethylene was used, and also the laminated film was obtained like the example -2. There was no concavo-convex state in the appearance (visual observation) of this roll, it is good and gloss was [ the laminated film was also smooth and ] also good. The coefficient of static friction of the low density polyethylenes of this laminated film was still better at 0.15.

[0023] an example -4 -- first -- an example -1 -- being the same (however, average thickness of a low density polyethylene having been set to 15 micrometers) -- it carried out and the winding roll of the laminated film of a bilayer with a length of 1200m was created Next, the melting film with a thickness of 30 micrometers which extruded the low density polyethylene [MFR14g / 10 minutes (190 degrees C), and density 0.918 g/cm<sup>3</sup>] at the resin temperature of 280 degrees C was stuck to the low-density-polyethylene side of the laminated film created previously by pressure by the nip roll using the extrusion equipment and lamination equipment (laminator) which were used in the example -1 (a part for 80m/in lamination speed), and it considered as the laminated film of three layers. This laminated film was rolled round in the shape of length a roll of 1000m. There was no concavo-convex state in the appearance (visual observation) of this roll, it is good and gloss was [ the laminated film was also smooth and ] also good.

[0024] an example -5 -- first -- an example -1 -- being the same (however, average thickness of a low density polyethylene having been set to 15 micrometers) -- it carried out and the winding roll of a bilayer laminated film with a length of 1200m was created Next, the extrusion equipment and lamination equipment (laminator) which were used in the example -1 are used. The low density polyethylene [MFR 14g /, 10 minutes (190 degrees C), and density 0.918 g/cm<sup>3</sup>] which contains 0.20 % of the weight of silicas of 0.15 % of the weight (slipping agent) of octadecanamide, and 3 micrometers of mean particle diameters in the low-density-polyethylene side of the bilayer laminated film created previously Stick by pressure a melting film with a thickness of 30 micrometers extruded from the die at the resin temperature of 280 degrees C by the nip roll (a part for 80m/in lamination speed). It considered as the laminated film of three layers. This laminated film was rolled round in the shape of length a roll of 1000m. There was no concavo-convex state in the appearance (visual observation) of this roll, it is good and gloss was [ the laminated film was also smooth and ] also good. The coefficient of static friction of the low density polyethylenes of this laminated film was still better at 0.18.

[0025] In the example of comparison -1 example -1, the die was changed into the usual die which is not equipped with the screw in the manifold with an aperture [  $\phi$  ] of 40mm, and also the roll of a laminated film was obtained like the example -1. There was a concavo-convex state in the appearance (visual observation) of this roll, and it was bad. The outer diameter of the roll of a laminated film and the measurement result of the gloss of a laminated film are shown in Table 1.

[0026] Using the extrusion equipment and lamination equipment which were used in the example -1 of example of comparison-2 comparison, the laminated film was created like the example -1, and further, lubricant (3 micrometers of knickerbockers company NIKKARIKO mean particle diameters) was sprinkled to the low-density-polyethylene side, and it considered as the shape of a length winding roll of 1000m in it. It is [ a concavo-convex state ] in the appearance (visual observation) of this roll and was bad. Moreover, the detailed irregularity by lubricant occurred in the laminated film, and gloss was low bad to it. The coefficient of static friction of the low density polyethylenes of this laminated film was a little good at 0.30.

[0027] Using the extrusion equipment and lamination equipment which were used in the example -1 of example of comparison-3 comparison, the laminated film was manufactured

like the example -2, this laminated film was rolled round a length of 1000m, and it considered as the shape of a roll. It is [ a concavo-convex state ] in the appearance (visual observation) of this roll and (however, fewer than the example -1 of comparison) was bad.

[0028] Using the extrusion equipment and lamination equipment which were used in the example -1 of example of comparison-4 comparison, the laminated film was manufactured like the example -3, and further, lubricant (3 micrometers of knickerbockers company NIKKARIKO mean particle diameters) was sprinkled to the low-density-polyethylene side of an outermost layer of drum, and it considered as the shape of a length winding roll of 1000m in it. It is [ a concavo-convex state ] in the appearance (visual observation) of this roll and (however, fewer than the example -1 of comparison) was bad. Moreover, the detailed irregularity by lubricant occurred in the laminated film, gloss was low, and it was bad. The coefficient of static friction of low-density-polyethylene sides was good at 0.15. The outer diameter of the roll of a laminated film and the measurement result of the gloss of a laminated film are shown in Table 1.

[0029]

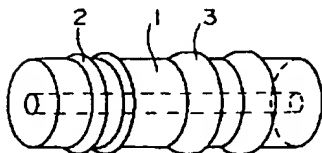
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## DESCRIPTION OF DRAWINGS

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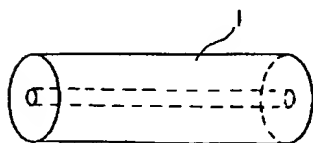
[Brief Description of the Drawings]

[Drawing 1] The perspective diagram of the rolling-up roll of the laminated film of a conventional method



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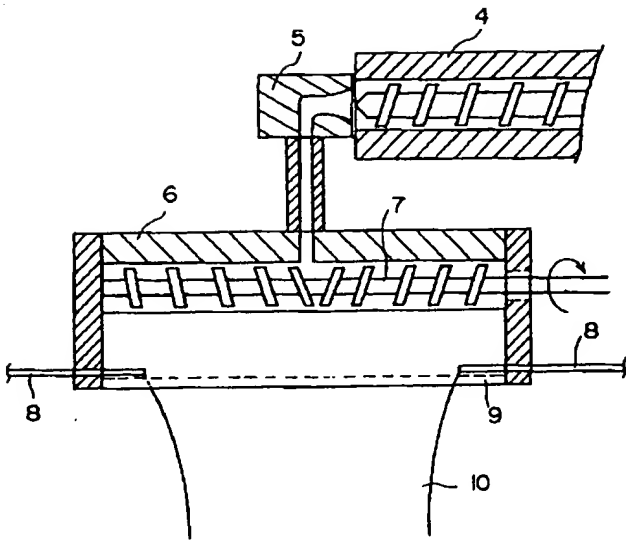
[Drawing 2] The perspective diagram of the rolling-up roll of the laminated film of this invention method



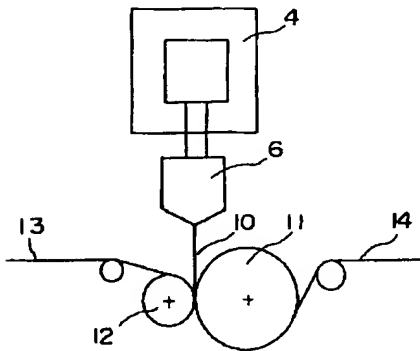
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[Drawing 3] The cross section of die structure

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[Drawing 4] The side elevation of a laminated-film manufacturing installation  
[Description of Notations]



- 1 Rolling-Up Roll of Laminated Film
- 2 Line -- Heights (Bone)
- 3 Heights (Phyma)
- 4 Extruder
- 5 Adapter
- 6 Die
- 7 Screw
- 8 Dekker
- 9 Die-Lip Section
- 10 Melting Resin Film
- 11 Cooling Roll
- 12 Pressure Roll
- 13 Base Material
- 14 Laminated Film

